

# Supply of health care – Hospitals

Angela Fertig

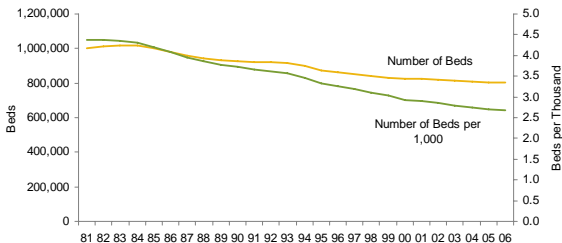
Spring 2009

- ▶ Last time, we discussed demand for health and health care.
- ▶ Now we are moving to the supply side.
- ▶ There are several topics important to hospitals which economics can say a lot...
  - ▶ Economies of Scale
  - ▶ Competition and Costs
  - ▶ Cost Shifting
  - ▶ Excess Demand in Nursing Homes

# Trends

TRENDWATCH CHARTBOOK 2008  
Trends in the Overall Health Care Market

Chart 2.2: Number of Beds and Number of Beds per 1,000 Persons, 1981 – 2006

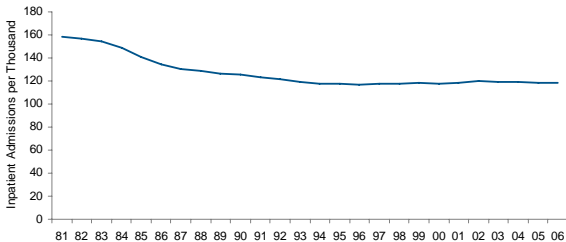


Source: Avalere Health analysis of American Hospital Association Annual Survey data, 2006, for community hospitals.

# Trends

TRENDWATCH CHARTBOOK 2008  
Trends in the Overall Health Care Market

Chart 3.3: Inpatient Admissions per 1,000 Persons, 1981 – 2006

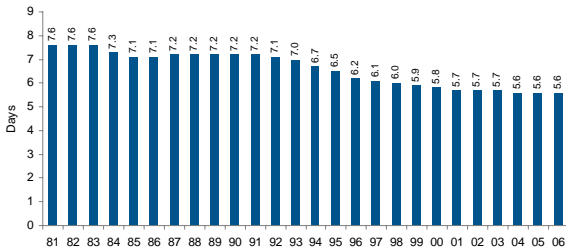


Source: Avalere Health analysis of American Hospital Association Annual Survey data, 2006, for community hospitals.  
US Census Bureau: National and State Population Estimates, July 1, 2006.  
Link: <http://www.census.gov/popest/states/tables/NST-EST2006-01.xls>.

# Trends

TRENDWATCH CHARTBOOK 2008  
Trends in the Overall Health Care Market

Chart 3.5: Average Length of Stay in Community Hospitals, 1981 – 2006

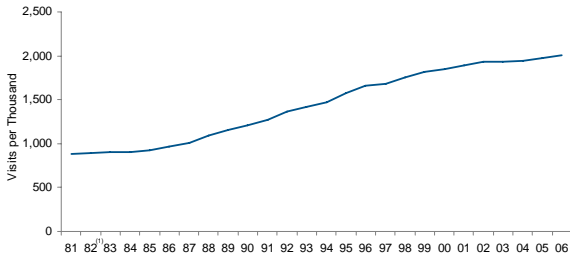


Source: Avalere Health analysis of American Hospital Association Annual Survey data, 2006, for community hospitals.

# Trends

TRENDWATCH CHARTBOOK 2008  
Trends in the Overall Health Care Market

Chart 3.13: Hospital Outpatient Visits per 1,000 Persons, 1981 – 2006



Source: Avalere Health analysis of American Hospital Association Annual Survey data, 2006, for community hospitals.

US Census Bureau: National and State Population Estimates, July 1, 2006.

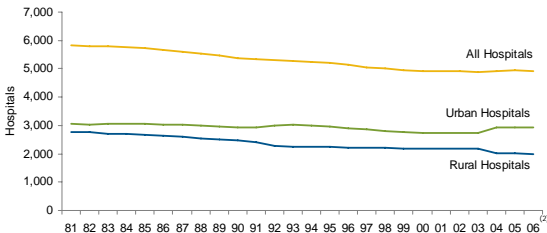
Link: <http://www.census.gov/popest/states/tables/NST-EST2006-01.xls>.

<sup>(1)</sup> Due to a restructuring of this survey question in 1982, some respondents reported occasions of service rather than visits, resulting in an artificially large number of outpatient visits. In 1983, the survey reverted back to the original question, which remains the same today. To smooth the trend line to better reflect what was the actual number of visits, the 1982 data point in the chart is an average of the 1981 and 1983 figures. The number collected from the survey is reported in the appendix table but should be used with caution.

# Trends

TRENDWATCH CHARTBOOK 2008  
Trends in the Overall Health Care Market

Chart 2.1: Number of Community Hospitals,<sup>(1)</sup> 1981 – 2006



Source: Avalere Health analysis of American Hospital Association Annual Survey data, 2006, for community hospitals.

<sup>(1)</sup> All nonfederal, short-term general, and specialty hospitals whose facilities and services are available to the public.

<sup>(2)</sup> Data on the number of urban and rural hospitals in 2004 and beyond were collected using coding different from previous years to reflect new Centers for Medicare & Medicaid Services wage area designations.

# Trends

- ▶ Number of hospital beds in US declining
- ▶ Number of outpatient visits rising
- ▶ As a result, many smaller hospitals have closed and others have merged
- ▶ Are bigger hospitals better, more efficient?  
To figure this out, we need to use cost curves.

## Average Fixed Cost

1. Average Fixed Cost = Fixed Cost/ $Q$
2. at  $Q=0$ ,  $AFC=\infty$  b/c divided by zero
3. downward sloping – as make more, fixed costs stay same and  $Q$  rises
4. growing flatter – at the beginning, fixed costs are a big part of each unit's cost

## Average Variable Cost

1. Average Variable Cost = Variable Cost/Q
2. intercepts y at 0 – no cost until first unit
3. mostly upward sloping – average cost goes up with units b/c of diminishing marginal product
4. linear or not – depends on how the cost per unit changes

# Average Total Cost

Average Total Cost = AFC + AVC → **u-shaped**

# Short-run v. Long-run ATC

ATC is flatter in LR – more flexibility in LR to adjust output

Example: Factory costs \$30, workers cost \$10 each, factory gets crowded

# Factories	# Workers	Output	TC	ATC
1	0	0		
1	5	10		
1	10	15		
1	15	16		
2	15	25		

# Short-run v. Long-run ATC

# Economies of Scale

**Defn:** A firm has economies of scale if it is more productive when larger

- ▶ if LR ATC is downward sloped, economies of scale
- ▶ if LR ATC is flat, constant returns to scale
- ▶ if LR ATC is upward sloped, diseconomies of scale

# Evidence

- ▶ If quality is ignored, hospitals exhibit economies of scale
  - ▶ Low quality hospitals exhibit economies of scale
  - ▶ Average quality have constant costs
  - ▶ High quality hospitals have diseconomies of scale
- ▶ Some work finds economies of scale up to 250 beds
- ▶ Athens Regional – 315 beds
- ▶ St. Marys – 196 beds
- ▶ Small hospitals in rural areas have high costs and low utilization

# Economies of Scope

**Defn:** A firm has economies of scope if it is more productive when producing many goods

e.g. telephone company

- ▶ scale: cheaper if more telephone customers, just string more wire, big costs are already paid
- ▶ scope: cheaper if sell phone, DSL, wireless, satellite, just one visit to your house to set up all

# Competition

- ▶ Economists argue that competition is best for consumers, except when natural monopoly (economies of scale) – this is why we have anti-trust laws
- ▶ Characteristics of competition
  - ▶ many sellers all offering same thing
  - ▶ if one offers higher price than others, no one will buy
  - ▶ if one offers lower price than others and is still making profit, then everyone will buy from them so others will lower their price
  - ▶ so this happens until sellers are at lowest possible price

## Question

Hospitals don't have big economies of scale, so not natural monopoly where less competition is better.

So, why is there a regulation like certificate-of-need laws, which restrict competition by limiting spending on new technology (capital) by hospitals?

- ▶ before managed care, retrospective reimbursement – cost more, get paid more, so hospitals may have wanted to get more expensive technology
- ▶ but now, prospective reimbursement – a diagnosis gets a payment and hospital has to eat costs above that payment – so huge incentive to be efficient and not buy equipment that isn't profitable

# Answer

- ▶ Health insurance dampens patients' sensitivity to cost/price which may lead hospitals to provide medically unnecessary services, so need regulation to restrict hospitals
- ▶ Medical arms race hypothesis – need to learn some game theory to understand

# Game Theory

Defn: Game Theory is the study of how people behave in strategic situations

**Prisoners' Dilemma**: game between 2 criminals suspected of committing a crime. The sentence that each receives depends both:

- ▶ on his/her decision whether to confess/remain silent and
- ▶ on the decision made by the other.

If one confesses and other doesn't, one who remains silent is put in jail

# Prisoners' Dilemma

**Strategic form** of the game

		Bonnie's Decision	
		confess	remain silent
Clyde's Decision	confess	(8,8)	(0,20)
	remain silent	(20,0)	(1,1)

Note: (Clyde, Bonnie), value=years in jail

# Nash Equilibrium

- ▶ **Nash eqbm** = situation in which each person chooses his/her best strategy given the strategies that the others have chosen
- ▶ Dominant Strategy = a strategy that is best for a player in a game regardless of the strategies chosen by the other players (doesn't always exist)

## NE in PD

		Bonnie's Decision	
		confess	remain silent
Clyde's Decision	confess	(8,8)	(0,20)
	remain silent	(20,0)	(1,1)

- ▶ If Bonnie remains silent, what is the best Clyde can do?
- ▶ If Bonnie confesses, what is the best Clyde can do?
- ▶ Symmetric game so the same for Bonnie
- ▶ **What is the NE in this game?**
- ▶ What would be best for both (min total years in jail)?

# Medical arms race

## Story

- ▶ If 2 hospitals adopt technology, revenues will be low b/c competition
- ▶ If both don't adopt, revenues high b/c no competition and no expense laid out
- ▶ If one adopts and other doesn't, adopter gets everything and other loses

## Strategic form of the game

		Hospital B	
		adopt	do not adopt
Hospital A	adopt	(100,100)	(200,-50)
	do not adopt	(-50,200)	(150,150)

Note: (A,B), value=profit

## NE in MAR

		Hospital B	
		adopt	do not adopt
Hospital A	adopt	(100,100)	(200,-50)
	do not adopt	(-50,200)	(150,150)

- ▶ If A doesn't adopt, what is the best B can do?
- ▶ If A adopts, what is the best B can do?
- ▶ Symmetric game so the same for A
- ▶ **What is the NE in this game?**
- ▶ What would be best for both (max revenues)?

## Back to original question

Why are there certificate-of-need laws which restrict capital investments of hospitals?

- ▶ medical arms race leads to excess capacity and therefore higher costs
- ▶ medical arms race can cause unnecessary services and potentially increased adverse patient health outcomes